CLAIMS

[Claim 1] A digital information carrier characterized by:

comprising a plurality of image objects as constituent elements;

containing cluster information carrier(s) constituted by at least two of the image objects; and

said cluster information carriers having bit data correlated to relative relationship(s) between said at least two image objects forming the constituent elements.

[Claim 2] A digital information carrier as set forth in claim 1, wherein among the relative relationship(s) between the image objects in the plurality constituting said cluster information carrier(s), a relative relationship to which the bit data does not correlate is arbitrarily configurable.

[Claim 3] A digital information carrier as set forth in claim 1 or 2, wherein at least one of the image objects forming the constituent elements of one of said cluster information carrier(s) forms a constituent element of another of said cluster information carrier(s).

[Claim 4] A digital information carrier characterized by:

comprising a plurality of image objects as constituent elements;

containing cluster information carrier(s) constituted by at least two of the image objects;

said cluster information carrier(s) having

a condition, correlated to a relative relationship between said at least two image objects forming the constituent elements, for determining whether image objects constitute a cluster information carrier, and

bit data correlated to said cluster information carrier(s) as units.

[Claim 5] A digital information carrier as set forth in claim 4, wherein the cluster information carrier for which said determination is being made has bit data correlated to a relative relationship between the plurality of image objects that are constituent elements.

[Claim 6] A digital information carrier as set forth in any of claims 1-5, wherein predetermined information is assigned to a relative arrangement of said cluster information carriers.

[Claim 7] A digital information carrier as set forth in claim 6, wherein the information assigned to said relative arrangement is information relating to a unifying rule for generating an information item by unifying bit data correlated to a plurality of said cluster information carriers.

[Claim 8] A digital information carrier as set forth in claim 6 or 7, wherein the relative arrangement of said cluster information carriers is assigned information relating either to coordinate axes for, or to the orientation of, an array of said cluster information carriers.

[Claim 9] A digital information carrier as set forth in claim 8, wherein a layout spacing between said cluster information carriers as arranged 2-dimensionally is defined for each coordinate axis.

[Claim 10] A digital information carrier as set forth in claim 8 or 9, wherein:

among a number d (wherein $d \geq 4$) of said cluster information carriers arranged consecutively, a number e of cluster information carriers satisfying the condition $e < d/2$ are arranged offset in a direction orthogonal to an arraying direction formed by the remaining number $d - e$ of cluster information carriers; and

the information relating to the coordinate axes is assigned to the arraying direction, and the information relating to orientation is assigned to the offset.

[Claim 11] A digital information carrier characterized in that:

configuration of a logical block formed by unifying a plurality of unit information carriers being the minimum units for decoding bit data from a digital information carrier is enabled;

an item of information is assigned to an array formed by unifying any number of constituent elements of said logical block concerned; and

configuration of a new logical block by replacing at least one of the constituent elements of said logical block with a unit information carrier neighboring said logical block is enabled.

[Claim 12] A digital information carrier as set forth in claim 11, wherein said logical block is constituted from a larger number of said unit information carriers than the number of elements in the array to which said item of information is assigned

[Claim 13] A digital information carrier as set forth in claim 11 or 12, wherein said item of information is information with which the layout coordinates of any constituent element of said logical block are specifiable.

[Claim 14] A digital information carrier characterized in:

containing a bit matrix V formed by arranging, in matrix form, array elements b_m (m = 0 to $n-1$) of a reference-bit array B having a predetermined array length n, wherein bit data is correlated to the bit matrix V;

that two matrix elements $v(i, j)$ and $v(i+1, j)$ neighboring one (i-axis) of the two array axes of the bit matrix V satisfy

$v(i, j) = b_m$

$v(i+1, j) = b_{m+1}$; and

that two matrix elements $v(i, j)$ and $v(i, j+1)$ neighboring the other array axis (j-axis) of the bit matrix V satisfy, letting the amount by which the array elements b_m are offset toward the j-axis be a,

$v(i, j) = b_m$

$v(i, j+1) = b_{m+a}$,

wherein the amount of offset a toward the j-axis is an integer equal to or greater than 2.

[Claim 15] A digital information carrier as set forth in claim 14, wherein:

for a logical block that is a partial matrix in the bit matrix V, in which any one matrix element $v(i, j)$ of the bit matrix V is the starting point, and the array length along the i-axis is the offset a,

with the positive direction of the i-axis being a main scanning direction and the positive direction of the j-axis being a sub-scanning direction, a bit array that is identical with a partial array of the reference-bit array B is formable by unifying any of the constituent elements of said logical block.

[Claim 16] A digital information carrier as set forth in claim 15, wherein the reference-bit array B is constituted so that partial arrays of predetermined length obtained with arbitrary offsets differ from each other.

[Claim 17] A digital information carrier as set forth in claim 15 or 16, wherein:

by replacing the matrix element $v(i, j)$ constituting said logical block and forming the terminus of the array in the main scanning direction,

on the condition that either of the matrix elements $v(i-a, j+1)$ and $v(i+a, j-1)$ neighbors said logical block,

with either of said matrix elements, configuration of a new logical block (virtual block) is enabled.

[Claim 18] A digital information carrier as set forth in any of the claims 15-17, wherein configuration of said new logical block is enabled by removing the matrix element which constitutes the first of said bit arrangement from said logical block, and by adding the matrix element adjacent to the matrix element which constitutes the last of this bit arrangement concerned on the side of the main scanning direction.

[Claim 19] A digital information carrier as set forth in any of the claims 15-17, wherein configuration of said new logical block is enabled by removing the matrix element which constitutes the last of said bit arrangement from said logical block, and by adding the matrix element adjacent to the matrix element which constitutes the first of this bit arrangement concerned on the opposite side of the main scanning direction.

[Claim 20] A display medium on which the digital information carrier as set forth in any of the claims 1-19 is displayed.

[Claim 21] A display device on which the digital information carrier as set forth in any of the claims 1-19 is displayed.

[Claim 22] Recording medium on which the display data of the digital information carrier as set forth in any of the claims 1-19 is recorded.

[Claim 23] A system for creating digital information carrier characterized in

that it is equipped with an input device for data input, a processing device for processing the inputted data and for generating data concerning the digital information carrier consisting of a plurality of image objects, and an output device for outputting data concerning the generated digital information carrier, and

that said processing device comprises

conversion means for converting said inputted data into bit data and

generation means for identifying at least two image objects correlating to the bit data converted by said conversion means and the relative relationship of these and for generating image data of cluster information carrier which consists of said at least two image objects based on the identified contents.

[Claim 24] A system for creating digital information carrier as set forth in claim 23 wherein

the bit data after conversion is converted into a bit arrangement which uses bit data having the data size below the maximum amount of data as an element by the conversion means concerned, when the amount of data of the bit data obtained by said conversion means is more than said maximum amount of data which a single cluster information carrier can display,

and by the generation means, while image data of a plurality of said cluster information carriers is generated to correlate to the bit data which serve as an element of the bit arrangement, the display position of a plurality of the image data concerned is determined to correlate to the arrangement relationship of said bit arrangement.

[Claim 25] A system for creating digital information carrier as set forth in claim 23 or 24 wherein

the processing device is equipped with an input / output part which exchanges a data signal with said input device and said output device, a processing part which processes the data inputted from the input / output part concerned, and a memory part which records the data required in order for the processing part concerned to carry out data processing,

said memory part has image data of said cluster information carrier and correspondence relationship data concerning the correspondence relationship between the cluster information carrier concerned and said bit data, and

said generation means comprises of

selection means for selecting said cluster information carriers correlating to the bit data converted by said conversion means based on said correspondence relationship data stored in said memory part,

reading means for reading the image data correlating to said cluster information carriers selected by said selection means from said memory part, and

determination means for determining the display position of the image data of said cluster information carriers read by said reading means.

[Claim 26] A method for creating digital information carrier characterized in

that it is a method for creating a digital information carrier performed by a processing device which generates the data concerning digital information carrier consisting of a plurality of image objects according to the data inputted into an input device for data input and outputs to an output device, and

that it comprises a conversion step for converting said inputted data into bit data and

a generation step for identifying at least two image objects correlating to the bit data converted by said conversion means and the relative relationship of these and for generating the image data of a cluster information carrier which consists of said at least two image objects based on the identified content concerned.

[Claim 27] A method for creating digital information carrier as set forth in claim 26 wherein

the bit data after conversion is converted into a bit arrangement which uses bit data having the data size below the maximum amount of data as an element by the conversion step concerned, when the amount of data of the bit data obtained by said

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conversion means is more than said maximum amount of data which said single cluster information carrier can display,

and by said generation step, while image data of a plurality of said cluster information carriers are generated and correlated to the bit data which serve as an element of the bit arrangement concerned, the display position of a plurality of the image data concerned is determined to correlate to the arrangement relationship of said bit arrangement.

[Claim 28] A method for creating digital information carrier as set forth in claim 26 or 27 wherein

said processing device is equipped with an input / output part which exchanges a data signal with said input device and said output device, a processing part which processes the data inputted from the input / output part concerned, and a memory part which records the data required in order for the processing part concerned to carry out data processing,

said memory part has image data of said cluster information carrier and correspondence relationship data concerning the correspondence relationship between the cluster information carrier concerned and said bit data, and

said generation step comprises

a selection step for selecting said cluster information carriers correlating to the bit data converted by said conversion step based on said correspondence relationship data stored in said memory part,

a reading step for reading the image data correlating to said cluster information carriers selected by said selection step from said memory part, and

a determination step for determining the display position of the image data of said cluster information carriers read by said reading step.

[Claim 29] A system for generation of decoded information for digital information carrier characterized in

that it is equipped with an input device for inputting digital information carrier which consists of a plurality of image objects, a processing device for performing processing for generating the decoded information which said inputted digital information carrier holds, and an output device which outputs the decoded information concerned, and

that said processing device is equipped with

a recognition means for recognizing said digital information carrier inputted from said input device as a plurality of image objects,

a cluster judging means for judging whether one of a plurality of the image objects concerned makes a group with any other image object and constitutes a cluster information carrier, and

means for generation of decoded information for decoding bit data from the judged cluster information carrier given that it is judged to constitute said cluster information carrier and for generating decoded information based on the bit data concerned.

[Claim 30 A system for generation of decoded information for digital information carrier as set forth in claim 29 wherein

when there is a plurality of cluster information carriers judged by said cluster judging means,

by said decoded information generation means,

a plurality of bit data is generated by decoding a plurality of the cluster information carriers concerned, some of the plurality of the bit data concerned are unified to form a bit array based on the relative arrangement of a plurality of said cluster information carriers, and unit information is generated as decoded information from the bit arrangement concerned.

[Claim 31] A system for generation of decoded information for digital information carrier as set forth in claim 29 or 30 wherein

said processing device has a processing part which handles data processing and a memory part which records data required for data processing by said processing part, and

with said cluster judging means, the relative relationship of a plurality of image objects serves as the judgment condition and this judgment condition is stored in said memory part.

[Claim 32] A system for generation of decoded information for digital information carrier as set forth in claim 31 wherein

said cluster information carrier has bit data correlating to the relative relationship of a plurality of image objects which are its constituent elements,

said memory part has the correspondence relationship data concerning the correspondence relationship between said relative relationship and bit data, and

said decoding information generation means includes a decoding means for decoding bit data from said cluster information carrier based on said correspondence relationship data stored in said memory part.

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[Claim 33] A system for generation of decoded information for digital information carrier given in any of claims 29-32 which is equipped with a display state judging means for evaluating how much the display state of a plurality of image objects constituting cluster information carriers judged by said cluster judging means is out of alignment from the ideal display state of the cluster information carriers concerned and for judging whether it would be decoded by said means for generation of decoded information based on the result of the evaluation concerned.

[Claim 34] A method for generation of decoded information for digital information carrier characterized in

that it is a method for generation of decoded information for digital information carrier performed by a processing device which inputs digital information carrier consisting of a plurality of image objects, generates decoded information obtained by processing said digital information carrier inputted into the input device, and outputs the decoded information concerned, and

said processing device comprises

a recognition step for recognizing said digital information carrier inputted from said input device as a plurality of image objects,

a cluster judging step for judging whether one of a plurality of the image objects recognized by said recognition step makes a group with any other image object and constitutes a cluster information carrier, and

a decoding information generation step for decoding bit data from the judged cluster information carrier given that it is judged to constitute a cluster information carrier by said cluster judging step and for generating decoded information based on the bit data concerned.

[Claim 35] A method for generation of decoded information for digital information carrier as set forth in claim 34 wherein

when there are a plurality of cluster information carriers judged by said cluster judging step,

by said decoding information generation step,

a plurality of bit data are generated by decoding a plurality of said cluster information carriers, some of the plurality of the bit data concerned are unified to form a bit array based on the relative arrangement of a plurality of said cluster information carriers, and unit information is generated as decoded information from the bit arrangement concerned.

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[Claim 36] A method for generation of decoded information for digital information carrier as set forth in claim 34 or 35 wherein

said processing device has a processing part which handles data processing and a memory part which records data required for data processing by said processing part, and

at above-mentioned cluster judging step, the relative relationship of a plurality of image objects serves as a judgment condition and this judgment condition is stored in said memory part.

[Claim 37] A method for generation of decoded information for digital information carrier as set forth in claim 36 wherein

said cluster information carrier has bit data correlating to the relative relationship of a plurality of image objects which are its constituent elements,

said memory part has the correspondence relationship data concerning the correspondence relationship between said relative relationship and bit data, and

said step for generation of decoded information includes a decoding step for decoding bit data from said cluster information carrier based on said correspondence relationship data stored in said memory part.

[Claim 38] A method for generation of decoded information for digital information carrier given in any of claims 34-37 equipped with a display state judging step for evaluating of how much the display state of a plurality of image objects constituting cluster information carriers judged by said cluster judging step is out of alignment from the ideal display state of the cluster information carriers and for judging whether it would be decoded by said step for generation of decoded information based on the result of the evaluation concerned.

[Claim 39] A program for having a computer perform the method for creating digital information carrier given in any of claims 26-28.

[Claim 40] A program for having a computer perform method for generation of decoded information for digital information carrier given in any of Claims 34-38.

[Claim 41] A recording medium which has recorded the program for having a computer perform the method for creating digital information carrier given in any of claims 26-28 and for which computer reading is possible.

[Claim 42] A recording medium which has recorded the program for having a computer perform the method for generation of decoded information for digital information carrier given in any of claims 34-38 and for which computer reading is possible.